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ABSTRACT

In June 1992, Maui Community College (MCC), in Hawaii, conducted a survey of the communities of Maui, Molokai, Lanai, and Hana to determine perceived needs for an associate degree and certificate program in electronics and computer engineering. Questionnaires were mailed to 500 firms utilizing electronic or computer services, seeking information on the anticipated level and configuration of job openings within the next 5 years, types of in-service training, curricular emphasis, and class scheduling accessibility. Study findings, based on 102 completed questionnaires, included the following: (1) 55 of the 94 Maui firms that responded anticipated adding staff within the next 5 years; (2) 50 of these firms stated that they would consider hiring graduates of the proposed program, resulting in a total of 118 anticipated new hires; (3) 82% of these firms indicated that they would pay $8 per hour or more; (4) small service and repair companies accounted for 46% of the Maui firms willing to hire program graduates, with other major segments including government, banking, computer/office equipment, and engineering; (5) 70% of these companies reported 15 or fewer employees; (6) 37 of the 94 Maui firms estimated that 109 employees would need in-service training in computer programs, applications, systems, and microprocessors; (7) for the 7 firms responding from Molokai and Lanai, 1 Molokai firm anticipated hiring 1 new employee in the next 5 years, though a need for in-service training was expressed. The cover letter, survey instrument, and employer comments are attached. (KP)

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COMMUNITY NEEDS ASSESSMENT FOR AN ELECTRONICS AND COMPUTER ENGINEERING TECHNOLOGY PROGRAM AT MAUI, MOLOKAI, AND LANAI

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University of Hawaii -- Maui Community College
August 1994

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COMMUNITY NEEDS ASSESSMENT FOR AN ELECTRONICS AND COMPUTER ENGINEERING TECHNOLOGY PROGRAM AT MAUI, MOLOKAI, AND LANAI

PURPOSE

The purpose of this study was to ascertain the perceived needs of the community of Maui County for an Associate in Science degree and Certificate of Achievement program in Electronics and Computer Engineering at Maui Community College. Primary focus was on assessing the anticipated level and configuration of job openings in the field within the next five years at Maui, Molokai, Lanai, and Hana. Other topics researched the perceived level and type of in-service training, curricular emphasis, and class scheduling accessibility.

METHODOLOGY

A questionnaire (see Appendix A) was developed and field tested in the Spring 1994 semester by an MCC computer science lecturer and the Assistant Dean of Instruction and former Psychometrist, under the auspices of the Dean of Instruction.

The mailing list was developed from names and addresses taken from the yellow pages of the 1994 Maui, Molokai, and Lanai phone directory. The 500-name list incorporated a broad spectrum of firms utilizing electronic or computer services, including: county, state and federal government offices in Maui County, architects and engineering firms, facility management businesses, electricity and electronics service and repair, computer and office equipment sales and service, medical services, and automobile repair (see Appendix B).

On June 2, 1994, the 500 questionnaires, along with a cover letter from MCC Provost Clyde Sakamoto and a postage paid return envelop, were bulk mailed.

By August 1, 1994, 102 surveys were returned, for a return rate of 20 percent.

RESULTS

The results from the needs assessment are presented below. Reporting of the results is in two phases: analysis of the 94 Maui respondents first, and then the 7 Molokai, Lanai, and Hana respondents since career opportunities and training needs may differ on the separate islands.

1. Respondents were asked whether they anticipated adding technical staff in the next five years. Of the 94 Maui respondents:

    55 Anticipated adding staff.
    29 Anticipated not adding staff.
    10 Left item blank.

2. Of the 55 who anticipated adding technical staff, most (50, 91%) expressed support for the proposed program and indicated they would consider hiring its graduates.

    50 Would consider hiring graduates of proposed program.
    1 Would not, since all employees are hired through the union.
    1 Depended on quality of proposed program.
    1 Left item blank.

3. Anticipated Labor Demand. Of the 50 companies able and willing to hire potential graduates of this program in the next five years, the number of anticipated new employees is sizable (118), and of a magnitude to lend support for a program of this scope. The ECET program would need to produce an average of 23.6 majors per year to meet an anticipated demand for 118 new technical employees in the next 5 years. The distribution of anticipated new hires is:

No. Hires	No.Co.	Demand
1 new staff	10	10
2 new staff	21	42
3 new staff	8	24
4 new staff	4	16
5 new staff	2	10
8 new staff	2	16
Blank	3	-
	50	118

4. Anticipated Rate of Pay. Of the 50 companies anticipating new hires who would consider graduates of the proposed program, most (41, 82%) indicated they would pay $8 per hour or more.

Anticipated Hourly Wage	No.Co.	PrCnt
Minimum wage	--	--
$5.55-8 hourly wage	7	14%
$8-15 hourly wage	25	50%
$15-25 hourly wage	12	24%
$25+ hourly wage	1	2%
One employee at $8-15; other at $15-25	1	2%
Two responses checked: $8-15 & $15-25	1	2%
Three responses checked: $8-15, $15-25, $25+	1	2%
Unknown at this time	1	2%
Determined by Board of Directors	1	2%
Total companies able & willing to hire majors	50	100%

5. Type of Hiring Companies. Of the 50 companies who would be able and willing to hire graduates of the proposed program, about half (23, 46%) are concentrated in the service and repair business. Another quarter (13, 26%) are collectively in government, banking, and engineering. None of the 50 respondents were in facility management, union training, or agricultural/manufacturing, and only one business was in the visitor, food, transportation industry.

There is no apparent relationship between the type of firm and the anticipated hourly wage. For example, service and repair businesses spread the anticipated wage over four categories, ranging from $5/hr to over $25/hr.

Type of Company	Anticipated Hourly Wage: Min	$5-8	$8-15	$15-25	$25+	Blank	Ovrall
Service & Repair		2	11	8	1	1	23
Government		1	2	1			4
Banking			3			1	4
Computer/Ofc Equipment		1				1	2
Engineering		1	2	2			5
Visitor/food/transptn		1					1
Other:							11
Scientific Studies		1					
Lighting showroom			1				
Medical lab			1				
Architects			1				
Camera/video/photo			1				
Aviation			1				
Amusement			1				
Environmental consulting			1				
Utility				1			
Government R & D						1	
Law enforcement						1	
No. Companies:	0	7	25	12	1	5	50

6. Size of Hiring Companies. Most of the 50 companies which anticipate hiring ECET majors are relatively small companies: 70 percent have 15 or fewer employees. The distribution of hiring company sizes is shown below. Company sizes ranged from single-person organizations to ones with more than 400 employees. While the "mean" size is 37.7 employees, this statistic is not representative because the distribution is highly skewed. The "modal" range of 1-5 employees is more descriptive.

Company Size	No.Co.	PrCnt
1-5 employees	18	36%
6-10 employees	11	22%
11-15 employees	6	12%
16-20 employees	4	8%
21-25 employees	2	4%
30-35 employees	2	4%
50 employees	1	2%
75 employees	1	2%
170 employees	1	2%
184 employees	1	2%
200 employees	1	2%
400 employees	2	4%
Overall	50	100%

7. Employment Demand in Field. While an earlier-described question asked respondents whether their company anticipated job openings in the next five years, another item asked respondents for the number of jobs altogether in the field might come available on their island through attrition or new openings over the next five years. The 94 Maui respondents thought jobs openings would be available in a variety of electronics and computer engineering fields (see Appendix C for details). The four most frequently checked fields were: computer networks, air conditioning and refrigeration, computer theory and circuits, and power systems.

Fields with Anticipated Openings	No.Co.
Computer networks	19
Air conditioning & refrigeration	15
Computer theory & circuits	13
Power systems electronics	11
Digital electronics & microprocessors	9
Consumer electronics service & repair	9
Data communications & fiber optics	7
Certified etron technician preparation	6
FCC license preparation	5
Biomedical electronics	5
Media or communications equipment	4
Environmental instrumentation	3
Aviation computer electronics	1
Item left blank	28

8. In-Service Training. When asked to estimate the number of employees who would take advantage of courses in various ECET curriculum areas if available at MCC, greatest interest was expressed for computer programs. More than a third (37, 39%) of the 94 Maui respondents estimated a collective total of 109 employees who would take advantage of courses in five subject areas: computer programs, computer applications, computer systems, CAD, and microprocessors. These results suggest the ECET program should provide curriculum in these five areas, while developing the other topics for curricular breath.

Subject matter	No.Co.	No.Emp.	*No.X	Adj.No.Emp.
Computer programs	37	100	9	109
Computer applications	31	89	9	98
Computer systems	28	72	8	80
Computer aided design	22	58	2	60
Microprocessors	13	49	3	52
Intro supercomputer	13	45	3	48
Elec/etron test equipment	19	43	5	48
Troubleshooting	19	40	7	47
Etron devices/circuits	19	43	4	47
Electricity	15	43	2	45
DC/AC circuits	13	40	3	43
Digital circuits/systems	14	36	5	41
Networking (NOVELL)	22	35	4	39
Integrated circuits	13	31	3	34
Electric power	8	25	2	27
C programming	10	13	2	15
Applied math/science	6	9	2	11
Item left blank	31			

* These companies re-interpreted the question by placing an "x", instead of a number, to indicate the number of employees who might take a particular topic if offered at MCC. The data analysis reconciles the variation by assigning the value of "1" for each "x", assuming each company using an "x" would send a minimum of one employee.

9. Convenient Class Schedule. Respondents were then asked when employees would most likely take advantage of these courses. The most convenient time by far is evenings, with 66 percent of the Maui respondents expressing availability at this time. Only 14 percent of the respondents indicated the traditional morning classes would meet the needs of their employees. This result suggests that if the ECET program intends to provide in-service training, evening classes should be considered.

Class Time	No.	PrCnt
Mornings	14	15%
Afternoons	8	8%
Evenings	62	66%
Weekends	28	30%
Blank	19	20%
	131	139%*

* Note: Total percentage exceeds 100 percent, because respondents checked more than one time if applicable.)

10. Outside Training. Of the 94 Maui respondents, about a third (30, 32%) reported receiving training within the past year (see Appendix D). The 30 companies reported a total of 1,867 hours of training for themselves or their employees. Much of the training was received here on Maui: only 11 companies reported off-island training (mostly at Honolulu). Nine (9) companies credited the VITEC program or MCC for their training.

11. Outreach Needs. Survey responses from Molokai, Lanai, and Hana were analyzed separately because training needs and opportunities may differ at these sites. Caution should be used before assuming reliability of the outreach results, because the sample sizes are relatively small.

Outreach Location	Sent	Recvd	Rate
Molokai	16	5	31%
Lanai	13	2	15%
Hana	3	0	-

The survey results support a need for ECET training on the islands of Molokai and Lanai. One of the Molokai firms, of the 5 firms responding, anticipated hiring one new employee in the next five years. The small, 5-employee company in electronics service and repair anticipates paying $8-15/hr. On Lanai, neither of the two responding firms anticipated hiring in the electronics field.

An apparent need emerged for in-service training on Molokai as well as Lanai. Both islands expressed a need for coursework in the electronic and computer technology fields for their employees. The projected training needs are not unlike that found on Maui, with concentration in the computer field: computer programs, computer systems, and computer applications. Troubleshooting, electricity, and microprocessors could be added to the list of potential classes.

Subject matter	Molokai No.Co.	Molokai No.Emp.	Lanai No.Co.	Lanai No.Emp.
Computer programs	2	5	2	11
Computer systems	2	4	1	10
Computer applications	2	5		
Troubleshooting	2	6		
Electricity	2	3	1	1
Elec/etron test equip	2	3		
NOVELL	2	2		
Microprocessors	1	1	1	10
DC/AC circuits	1	1		
Electric power	1	1		
Integrated circuits	1	1		
CAD	1	1		
Etron devices/circuits	1	1		
Digital circuits/systems	1	1		
Supercomputer	1	1		
C programming	1	1		
Applied math/science	1	1		

As on Maui, the evenings and weekends were considered the most convenient hours for in-service classes:

evenings (3), weekends (3), mornings (1), afternoons (1)

Outreach respondents reiterated the anticipation that jobs in the computer and electronics field would become available on their island, though not necessarily at their company. Two Molokai firms and one from Lanai perceived jobs opening up on their island in the fields of biomedical and computer networks.

Anticipated Openings	Molokai	Lanai
Biomedical	2	3
Computer networks	1	3
Air conditioning & refrigeration	2	
Consumer etron S & R	1	
Digital etron/microprocessors		10
Data communications		2

As for current training, one Molokai firm reported receiving 8 hours in Honolulu sponsored by the League Personal. Another Molokai respondent received 60 hours in Data Processing 101 at MCC Molokai.

12. Other Comments. The last item of the questionnaire left space for participants to make other comments. Several expressed further support for the ECET program. Others explained that their company's computer services are handled off-island. Appendix E records the verbatim comments of all 19 respondents to the open question.

SYNOPSIS

These results provide support for the establishment of an Electronics and Computer Engineering program at Maui Community College.

* The labor demand in this field is expected to be 24 new employees per year, based on responses to the needs assessment. At least one new hire is expected on Molokai.

* Rate of pay is anticipated above the minimum wage at $8/hr or more.

* Small service and repair companies would be the largest employers, although other segments would include government, banking, computer/office equipment, and engineering.

* A demand for new employees is anticipated in: computer networks, air conditioning and refrigeration, computer theory and circuits, and power system electronics.

* An apparent need for in-service training of current employees emerged on all islands, especially in computer programs, applications, and systems.

* The schedule should consider evening classes for in-service training of working adults.

APPENDIX A

ECET NEEDS ASSESSMENT
QUESTIONNAIRE

Maui Community College
UNIVERSITY OF HAWAII
OFFICE OF THE PROVOST

MEMORANDUM

TO: Survey Recipients

SUBJECT: Questionnaire

The attached survey is another of Maui Community College's efforts to meet the needs of the community it serves. We are exploring the need for a new program in Electronics and Computer Engineering Technology which we expect to meet the ever-increasing need for high-technology education for students who choose a vocational-technical path.

A program in Electronic and Computer Engineering Technology would graduate technicians for employment in the many businesses and industries in our County that use high-technology systems. We also expect that some of the graduates will take advantage of the opportunity to transfer to a four-year engineering technology program.

Your input will be of great importance in determining the need for this type of program. At present MCC offers only basic courses in electricity, electronics, computers, and science. It is our belief that with the installation of Maui's supercomputer, new industries will be looking to MCC to provide the educational infrastructure that will directly support their location or relocation to Maui's Research and Technology Park.

Please complete the attached survey with any comments and return it within ten (10) days in the enclosed envelop.

Thank you for your assistance.

Mahalo,

Clyde M. Sakamoto

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SURVEY ON MAUI COUNTY NEEDS FOR EDUCATION AND TRAINING IN ELECTRONIC AND COMPUTER ENGINEERING TECHNOLOGY

1. Estimate the number of employees in your firm, including yourself, who would take advantage of program/courses in these areas of electronics or computer engineering if available at MCC:

___ electricity
___ DC/AC circuits
___ electric power
___ integrated circuits
___ microprocessors
___ computer programs
___ computer applications
___ computer aided design
___ networking & data communications (NOVELL)
___ electrical & electronic test equipment
___ electronic devices & circuits
___ troubleshooting
___ digital circuits & systems
___ computer systems
___ introduction to the supercomputer
___ C programming language
___ applied math & science

2a. In what type of business are you involved?

___ service or repair
___ facility management
___ government
___ banking
___ computer/office equipment
___ apprenticeship or union training
___ engineering: consulting, training, design
___ agriculture, manufacturing, processing
___ visitor, food, or transportation industry
___ other: specify _____

2b. What is the size of your company: ___ number of employees

3. How many jobs in your field do you estimate may become available on your island either through attrition or new openings over the next 5 years?

___ Aviation computer electronics: Repair & maintenance of electronic or computer operated aircraft equipment.
___ Biomedical electronics: Repair & maintenance of electronic or computer operated medical, dental, x-ray equipment.
___ Environmental instrumentation: Installing, calibrating, testing, and servicing of electronic or computer instrumentation used to measure air, water, and soil quality.
___ Digital electronics & microprocessors: Programming, testing, and interfacing of digital and microprocessor circuits found in circuit boards of automobiles, electronic typewriters.
___ Consumer electronics service & repair: Fundamentals of electronic and electrical theory for the service and repair of radios, TVs, VCRs.
___ Media or communications equipment: Use, service, and repair of TV cameras, video production equipment.
___ Power systems electronics: Installation, repair, and maintenance of electric power distribution equipment including generators, motors, transmission lines.
___ Data communications & fiber optics: Installation, maintenance, and programming of fiber optic equipment including phone and computer data systems, integrated data systems, satellite dishes.
___ Air conditioning and refrigeration: Repair & maintenance of electronic or computer controlled air conditioners or refrigeration systems.
___ Computer theory and circuits: Service & repair of computers, including troubleshooting, installing options, and customer relations.
___ Computer networks: Installation, maintenance, programming, and management.
___ Certified electronics technician preparation.
___ FCC license preparation.

4. If you or your employees received related training within the past year, specify the area(s):

How many hours of training were received? ___ hours

Where was training held? _____

Who was the instructor/sponsor? _____

5. If offered at MCC, when would you or your employees most likely take advantage of these courses? (Check all that apply.)

___ mornings ___ afternoons ___ evenings ___ weekends

6. In the next five years, do you anticipate adding technical staff? ___ yes ___ no

If so, how many? ___ employees

At what hourly rate of pay? ___ min. wage ($5.50) ___ $5.55-8 ___ $8-15 ___ $15-25 ___ $25+

7. Would you consider hiring graduates of the proposed program? ___ yes ___ no

8. Other comments:

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Please return the survey in the envelope provided, or mail to: Dean of Instruction, Maui Community College, 310 Ka'ahumanu Avenue, Kahului, HI 96732, Fax: 242-0862, ph: 242-1234.

Mahalo!

APPENDIX B

ECET NEEDS ASSESSMENT
Survey Sample

Site	Surveys Sent
Kahului	181
Wailuku	154
Lahaina	41
Kihei	50
Kula	10
Makawao	17
Haiku	5
Paia	6
Puunene	2
Pukalani	1
Honolulu	1
Molokai (16):	
Kalaupapa	1
Hoolehua	3
Kualapuu	1
Kaunakakai	11
Lanai	13
Hana	3
Total	500

APPENDIX C

PERCEIVED JOB OPENINGS

Field	No. Openings Perceived by Each Respondent	No.Co.
Aviation	5	1
Biomedical	1,2,10,330,x	5
Environmental	1,1,2	3
Digital	1,2,3,3,20,x,x,x,x	9
Consumer	1,1,2,2,50,x,x,x,x	9
Media	3,x,x,x	4
Power	2,3,2,1,2,2,5,50,330,x,x	11
Data comun	1,1,5,5,69,x,x	7
AC/refrig	1,1,1,1,1,5,20,x,x,x,x,x,x,x,x	15
Theory/circuits	1,1,1,1,1,1,2,15,400,x,x,x,x	13
Networks	1,1,1,2,3,1,1,1,1,1,1,10,10-21,240,x,x,x,x,x	19
Certification	1,2,3,5,x,x	6
FCC license	2,3,5,x,x	5
All categories "Zero"		7
All categories IDK or N/A		3
All categories left blank		23

APPENDIX D

RECENT OUTSIDE TRAINING

Hrs.	Training Content	Location	Sponsor
40	Troubleshoot	MCC	IBEW union
40	-	MauiBch/MCC	ContrsAssoc/MurphyConst
40	-	MCC/MauiHigh	Vendors
9	Fee license prep	MCC	Hishi
6	-	Sacred Hearts School	VITEC
20	DOS/WP	MCC	VITEC
12	WordPerfect	Maui	VITEC
32	Autocad	VITEC	VITEC
8	Lighting application	InHouse/VITEC	Local,Mainland/VITEC
8	-	Maui	Venders
24	-	Sony,Panasonic,RCA, Hitachi	Company technicians
4	From manufacturer	Kihei	Baeheinger/Mannheim
10	Computer pgms	OJT	-
20	Cmptr app,sys,net	Seminars	
4	-	Hotel	Whirlpool
8	AMTetron/cmptr ign	Maui Palms	Champion Spark Plug Co.
40	-	Maui Beach	GE
40	AC/enrgy mgt cmptr/ fire alarms/flt info display systems	Kahului Airport	Equipment contractor
40	-	Maui/Honolulu	Motorola C&E
40	-	Honolulu/Maui	Atomic/Radionics
16	OMC trng seminar	Honolulu	OMC
24	Digital electronics	Honolulu	Factory trainer
300	cmptr pgms,apps,net	Honolulu	U.S. Air Force
4	-	Honolulu	Manufacturer
400	-	Oahu	Vendors
8	Sabre computer	Oahu	American Airlines Instr
100	Sales/S&R	Oahu/Oregon	GTE/Oki
40	UNIX	Dallas/Philadelphia	Company
530	Etron tech, Sony adv trng	Devry Inst: Phoenix/ Sony Hawaii	Professors Ron Okuda

1,867 hrs.

APPENDIX E

OTHER COMMENTS

Government certification requires constant training and certification due to changes.

Everyone at our newspaper uses computers at one point or another in their jobs. Basic knowledge of hook-ups, networks, hardware maintenance, and electronics would be beneficial.

For an island with the population of Maui an "Associates Degree" program in electronics and computer engineering is a must, if for the high school graduates alone! [signed]

I think it's a great idea to provide these courses for us, but most of all for our children. We would probably be able to hold on to our best resources – Our educated children.

Should this program materialize, it would give us, Maui County people who are educated and trained on the island, a resource we can select from when job opportunity arises.

Because of location, district central of certain positions which are on Maui, makes technical position on Molokai very unlikely.

Right now economy is recovering from a very slow period of 2 years. If the recovery is strong in the next 3 years we will need 2 people. [2 was designed on Item 6.]

If more qualified personnel were available, we could service a lot of the equipment ourselves instead of going out on contract. [government]

State computer services are centered in downtown Honolulu. We have to rely on them for any assistance. [government]

Hiring and company growth is dependent upon federal and state funding and concern with environmental issues. Current trend in State is a reduction in funding and directing available research funds to the University. [environmental consulting]

Ours is a small business, and we're ready to retire soon. [office equipment service and repair]

Due to our field, we only have 1 Biomed opening (to support 3 clinics) and only 1 Info Services position. [medical clinic]

I'm afraid this program would not really have an effect on my hiring of personnel. [retail tire sales and service]

All of my employees are hired through the IBEW union.

Program not directly related to our field. [contracting]

We are always looking for someone who has computer training in bookkeeping. [travel agency]

On the job training or Sabre Computer School.

Please keep me informed of additional training programs and graduating students in the next year and a half. [address given]

I may be interested in working with instructors who teach power systems, generators, ups, etc. [phone given]